

FIRST LISTED OF BLACKFLIES WITH TWO NEW SPECIES FROM SHENNONGJIA, HUBEI PROVINCE, CHINA (DIPTERA, SIMULIIDAE)

CHEN Har Bin¹, LUO Hong Bin², YANG Ming¹

1. Guiyang Medical University, Guiyang 550004, China

2. Medical School of Hubei Institute for Nationalities, Enshi 445000, China

Abstract The present paper provides the first checklist of the blackflies from Shennongjia Nature Reserve, Hubei Province. It is comprised of 12 species including 2 new species, which belonging to 3 subgenera of genus *Simulium* Latreille. The specific names were given by the type locality. The descriptions of morphology and taxonomic discussion of the present two new species are given.

Key words Diptera, Simuliidae, new species, Shennongjia Nature Reserve.

The Simuliidae are small stout-bodied midges. This family is nearly cosmopolitan, being found almost anywhere if there are developmental stages. The *Simulium* Latreille is a large genus of the family Simuliidae including more than 350 species in the world and 87 species among them from China (Crosskey *et al.*, 1997). The simuliid fauna of Hubei Province has been poorly studied with only 6 species listed by Chen and An (2003), whereas no blackfly species reported so far from Shennongjia Nature Reserve. In this paper, the authors report a total of 12 species, including 3 new species and 2 among them, *Simulium* (*Simulium*) *hongpingense* sp. nov. and *S.* (*S.*) *xiaolongtanense* sp. nov., are described. These materials were collected in Aug. 2004., from Shennongjia Nature Reserve. The type specimens are deposited in the Department of Biology, Guiyang Medical University.

1 Catalogue of Blackflies from Shennongjia

Family Simuliidae

Genus *Simulium* Latreille, 1802

Subgenus *Gomphostilbia* Enderlein, 1921

S. (*G.*) *guizhouense* Chen, Zhang and Yang, 2003

Subgenus *Nevermannia* Enderlein, 1921

S. (*N.*) *novigracile* Deng, Zhang and Chen, 1996

Subgenus *Simulium* Latreille, 1802

griseifrons group

S. (*S.*) *hengshanense* Zhang, Bi and Chen, 2004

S. (*S.*) *hongpingense* sp. nov.

malyschevi group

S. (*S.*) *lichuanense* sp. nov. (beling published)

striatum group

S. (*S.*) *quinquestriatum* (Shiraki, 1935)

S. (*S.*) *sakishimaense* Takaoka, 1977

S. (*S.*) *ephippiodum* Chen and Wen, 1999

S. (*S.*) *xiaolongtanense* sp. nov.

tuberosum group

S. (*S.*) *rufibasis* Brunetti, 1911

S. (*S.*) *shennongjiaense* Yang, Luo and Chen, 2005

variegatum group

S. (*S.*) *qianense* Chen and Chen, 2001

2 Descriptions of Two New Species

Simulium (*Simulium*) *hongpingense* sp. nov.
(Figs. 1-14)

Female. Body length 2.4 mm. Wing length 2.0 mm.

Head. Narrower than thorax. Frons and clypeus black, covered with several brownish black hairs; frontal ratio 7.5: 5.4: 6.6, frons: head ratio 7.5: 30.4. Antenna composed of 2+ 9 segments, scape and pedicel pale, rest brown. Maxillary palp brownish black, composed of 5 segments with proportional length of 3rd to 5th segments 6.0: 5.5: 10.2; 3rd segment of moderate size; sensory vesicle oblong, about 0.25 times the length of 3rd segment. Maxillary lacinia with 6 inner and 11 outer teeth. Mandible with 27 inner teeth and 12 outer ones. Cibarium armed with a cluster of minute tubercles.

Thorax. Scutum black, not patterned and covered with yellowish white pubescence. Scutellum black,

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with black hairs. Postscutellum black and bare. Pleural membrane and katepisternum bare. Legs. Fore leg yellow except distal 1/4 of tibia and all tarsomeres black; mid leg yellow except coxa, trochanter, distal 2/5 of basitarsus and rest tarsomeres black; hind leg yellow except coxa, distal cap of femur and tibia, distal 2/5 of basitarsus, distal 1/2 of second tarsomere and rest hind tarsal segments black. Fore basitarsus dilated, $W:L = 1.0:4.0$. Hind basitarsus nearly parallel-sided, $W:L = 5.6$. Calcipala moderately developed, about 1/2 width of basitarsal tip. Pedisulcus well developed. Wing. Costa with spinules and hairs; subcosta hairy; basal section of radius bare; base of costa and radius with a tuft of black hairs.

Abdomen Basal scale black with fringe of dark hairs. Terga dark brown except 2nd segment pale brown. Genitalia. Sternite 8 with posterior margin broadly curved and with about 12 long setae on each side. Anterior gonapophyses triangular, inner margins nearly straight and narrowly sclerotized. Genital fork of usual Y-shape, with slender, sclerotized stem, each arm with strongly sclerotized posterolateral ridge but lacking any projection directed forward. Paraproct and cercus of moderate size. Spermatheca spherical and with reticulate pattern.

Male Body length about 2.6 mm. Wing length about 2.1 mm.

Head Clypeus black, covered with a few black hairs. Upper eye consisting of large facets in 12 vertical and 12 horizontal rows. Antenna composed of 2 + 9 segments, pale yellow except 6th to 9th flagellomeres brown; 1st flagellar segment about 2.0 times as long as the following one. Maxillary palp with 5 segments proportion of 3rd, 4th and 5th segments 4.0: 5.4: 15.8; sensory vesicle about 0.34 of the length of 3rd segment.

Thorax. Scutum black, densely covered with yellow pubescence, and with white pruinose pattern composed of anterior area, a large white spot on prescutellar area contiguous to anterior spot by band along lateral margins. Scutellum, postscutellum, pleural membrane and katepisternum as in female. Legs and wing. Nearly as in female except distal cap of fore and hind femora which are black; fore and hind tibiae median large portions of outer surface which are yellow; fore basitarsus of moderate size, $W:L = 1.0:7.0$; hind basitarsus enlarged, $W:L = 1.0:3.9$; and the base subcosta of wing bare.

Abdomen Nearly as in the female. Genitalia. Coxite in ventral view subconical in shape, length

about 0.6 times width and 0.5 length of style. Style of moderate length, about 3 times as long as its greatest width near the basal 1/3, gradually narrowed towards distal 1/3 and then widened distally and lacking apical spine; from the base, each sends upwards a horn-like protuberance and bearing several stout teeth on its anterior margin and with pointed distal end. Ventral plate flat, rectangular in shape, with nearly straight distal margin and weakly convex proximal margin; basal arms subequal to length of plate body. Parameres each with about 6 strongly developed parameral hooks as well as numerous undeveloped ones. Median sclerite plate-like and with level end.

Pupa. Body length about 2.7 mm.

Head and thorax. Head integument densely covered with tubercles, whereas the thorax sparsely covered with tubercles. Head trichomes 3 pairs and thoracic trichomes 6 pairs of more or less split into 2-5 branches. Gill organ with 6 filaments arranged in 3 pairs; outer filaments of dorsal and middle pairs a little thicker than other 4 filaments; almost sessile or very shortly stalked, equal in length and about 2/5 as long as pupal body proper.

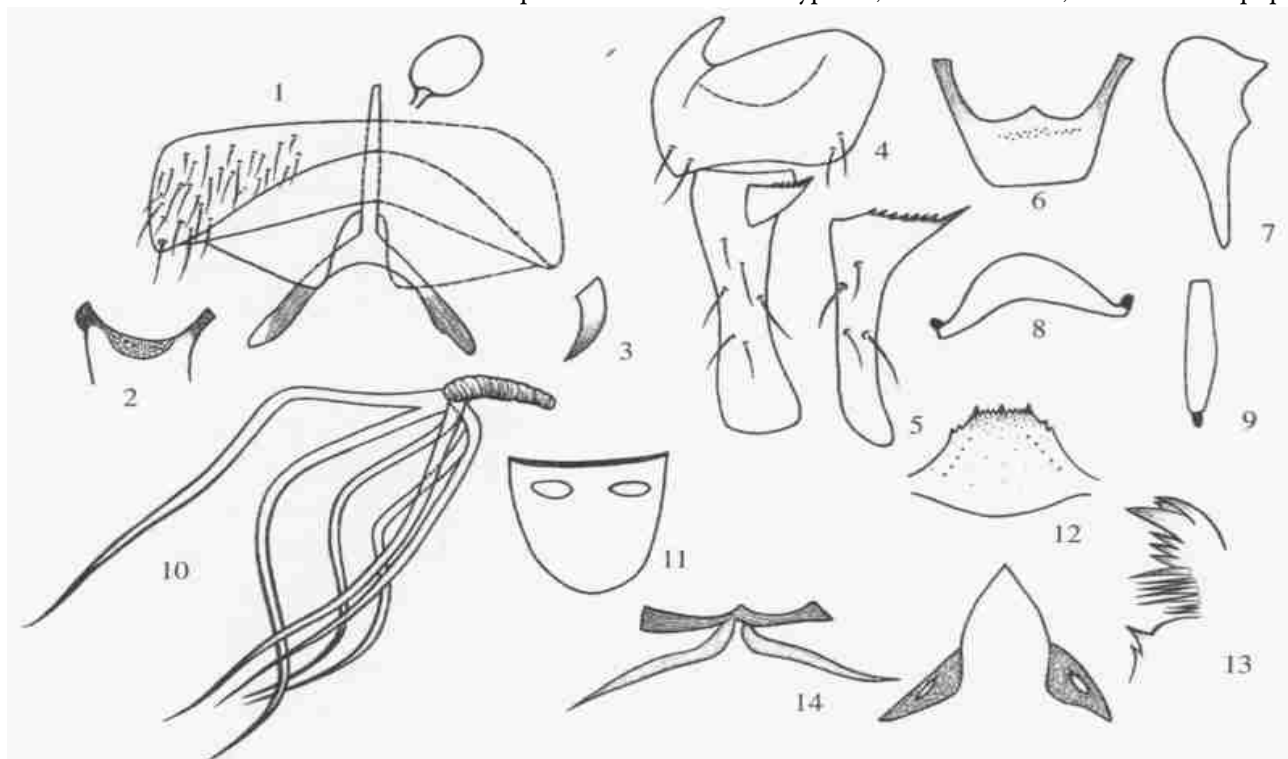
Abdomen. Tergum 2 with a long seta and 5 stout setae on each side. Terga 3 and 4 each with 4 hooked spines along anterior margin on each side; terga 7 and 8 each with a cross row of spine-combs on each side. Tergum 9 lacking terminal hooks. Sternum 4 with a bifid hook and a minute simple seta on each side. Sternum 5 with a pair of bifid hooks close together submedially on each side. Sterna 6 and 7 each with pair of bifid inner and simple outer hooks widely spaced on each side. Cocoon. Wall pocket-shaped, tightly woven, not extending ventrolaterally but having anterolateral window on either side and with moderate anterior margin.

Mature larva. Body length about 5.0 mm. Cephalic apotome with indistinct head spots. Antenna composed of 4 segments, longer than stem of cephalic fan; length ratio 7.2:3.1:3.6:0.3. Cephalic fan with about 38 main rays. Mandible with a large and a small mandibular serration but without supernumerary serration. Hypostomial teeth 9 in number, small with median and corner teeth longer than others; 5 hypostomial bristles lying subparallel to lateral border on each side. Postgenal cleft spear-shaped, pointed anteriorly and about 3.0-3.5 times length of postgenal bridge. Thoracic and abdominal integument bare. Rectal gill of 3 lobes each with 12-15 secondary lobules. Anal sclerite X-shaped, with broadened

anterior arms which is 0.55 length of posterior ones. Posterior circlet with about 84 rows of up to 14

hooklets per row. Ventral papillae absent.

Holotype ♀, slide mounted, reared from pupa,



Figs. 1-14. *Simulium (Simulium) hongpingense* sp. nov. 1. Female genitalia. 2. Gbarium. 3. Claw of female. 4. Coxite and style of male. 5. Style in lateral view. 6. Ventral plate. 7. Ventral plate in lateral view. 8. Ventral plate in end view. 9. Median sclerite. 10. Pupal filaments. 11. Cocoon. 12. Larval head capsule in ventral view. 13. Mandible of larva. 14. Larval anal sclerite.

collected from Hongping, Shennongjia, Hubei Province ($31^{\circ}32'N$, $110^{\circ}17'E$; alt. 1 680 m), water temperature $15^{\circ}C$. 14 Aug. 2004, by LOU Hong Bin. Paratypes 2 ♂♂, 4 pupae and 3 larvae. Pupae and larvae were collected from submerged grass blades of a small shaded stream, all slide mounted and same data as holotype.

Distribution. Hubei Province, China.

Remarks. The present new species can be assigned to the *griseifrons* group of the subgenus *Simulium* as defined by Takaoka and Davies (1995).

Although this species is very similar to some other known species of this group, such as *S. (S.) fuzhouense* and *S. (S.) ufengense* reported from China, the new species is clearly distinguishable from latter two species by the pupal cocoon having anterior lateral window on either side, and by the several characters including the characteristic scutum pattern and shape of ventral plate and median sclerite in the male.

Simulium (Simulium) xiaolongtanense sp. nov.
(Figs. 15-29)

Female. Body length 3.0 mm. Wing length 2.3

mm.

Head. Slightly narrower than thorax. Frons shiny black, covered with of a few black hairs along lateral borders; frontal ratio 8.0:6.1:7.5; frons head ratio 8.0:27.8. Clypeus black, grey pruinose and covered with several black hairs. Antenna composed of 2+9 segments, brownish black except scape and pedicel brownish yellow. Maxillary palp with 5 segments in proportion of 3rd, 4th and 5th segments 5.5:3.9:11.8, 3rd segment not enlarged; sensory vesicle about 1/3 length of 3rd segment. Maxilla with 13 inner teeth and 10 outer ones. Mandible with about 26 inner teeth and 13 outer ones. Cibarium smooth.

Thorax. Scutum brownish black uniformly covered with fine yellow pubescence, and with 5 longitudinal black vittae. Scutellum black with brown hairs. Postscutellum brownish black and bare. Pleural membrane and katepisternum bare. Legs. Fore coxa and trochanter yellow; mid and hind coxae and trochanters black. All femora and tibiae yellowish with distal 1/4 black. All tarsi black except of basal 1/3 of mid basitarsus, basal 2/5 of hind basitarsus and basal 1/2 of second tarsomere yellowish. Fore basitarsus

somewhat dilated, W: L= 1.0: 4.0. Hind basitarsus nearly parallel-sided about 5.5 times as long as wide. Calcipala of moderate size, not reaching pedisulcus. Pedisulcus marked and situated at basal 1/3 of second tarsomere. All claws simple. Wing. Costa with spinules as well as hairs; subcosta hairy; basal section of radius bare; hair tuft on base of costa and stem vein black.

Abdomen. Basal scale brownish with fringe of yellowish long hairs. Terga dark except 2nd segment yellowish brown. Genitalia. Sternum 8 each with about 20 long hairs on each side. Anterior gonapophyses small and covered with numerous microsetae; inner margins not sclerotized, very widely separated and diverging from each other posteriorly; posterior margins slightly curved and rounded. Genital fork with slender and sclerotized stem, each arm with a small projection directed forwards. Spermatheca spherical, internal setae absent. Paraproct and cercus of moderate size.

Male. Body length 3.2 mm. Wing length 2.4 mm.

Head. Upper eye consisting of 12 horizontal and 12 vertical rows of large facets on each side. Clypeus grey-dusted, with black hairs. Antenna composed of 2 + 9 segments, 1st flagellar segment about 1.7 times as long as the following one. Maxillary palp with 5 segments in proportion of 3rd, 4th and 5th segments: 3.9: 5.4: 12.1; sensory vesicle about 0.3 times as long as 3rd segment.

Thorax. Nearly as in female except fore and hind tibiae with large whitish patch medially on outer surface; fore basitarsus not so dilated, about 6 times as long as its greatest breadth; hind basitarsus enlarged, wedge shaped, about 3.8 times as long as its greatest width near distal 4/5; subcosta of wing bare.

Abdomen. Nearly as in female. Genitalia. Coxite somewhat subconical in shape, a little shorter than broad. Style of moderate length, subparallel-sided, about 3 times as long as its greatest breadth near base and about 2 times as long as coxite; on its dorsal surface near the inner edge, each style sending upwards a horn-like basal protuberance and bearing several small teeth on its anterior margin; this protuberance about 1/4 as long as style and with somewhat rounded distal end; posterior end of style rounded and lacking apical spine. Ventral plate in ventral view somewhat peg-shaped and pointed apically; in lateral view having a swollen base with dentate posterior margin and with a finger-like median

process; basal arms strongly sclerotized and diverging from each other. Parameres each with several developed parameral hooks. Median sclerite plate-like, gradually widened distal and with a cleft apically.

Pupa. Body length about 3.0 mm.

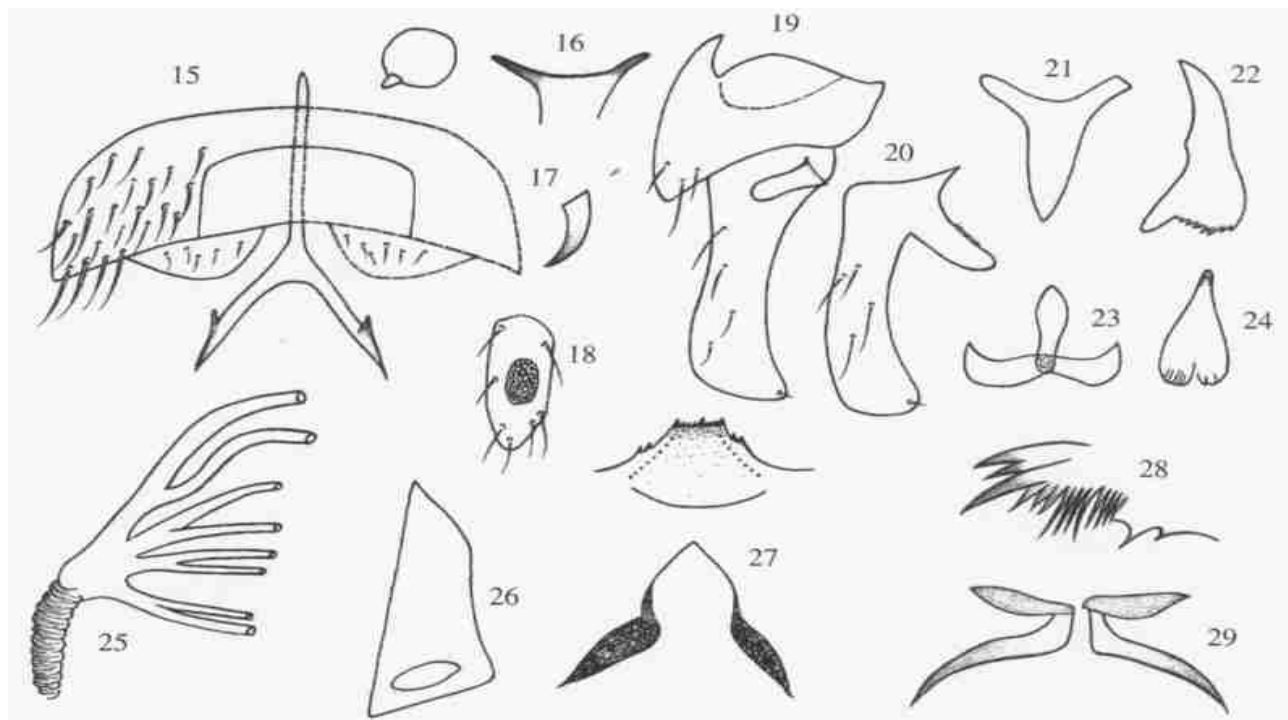
Head and thorax. The integument brownish yellow, sparsely covered with disc-like tubercles. Head trichomes 3 pairs all simple, whereas the thorax with 5 pairs of simple trichomes or split into 2 branches. Gill with 8 filaments, arranged in 4 pairs, each shortly stalked; all filaments short, about 1/2 as long as pupal body proper.

Abdomen. Tergum 1 brownish, with a long, simple seta on each side, tergum 2 with a long seta and 5 stout setae on each side; targa 3 and 4 each with 4 hooked spines directed anteriorly on each side; terga 7 and 8 each with spine-combs on each side; tergum 9 lacking terminal hooks. Sternum 5 with a pair of bifid hooks situated close together on each side; sterna 6 and 7 each with a pair of bifid inner and single outer hooks widely separated on each side. Cocoon. Wall-pocket-shaped, tightly woven, specially, with large antero-lateral window on each side; anterior border thickened into a moderately strong rim, but not extending ventrolaterally.

Mature larva. Body length about 5.0 mm.

Head. Cephalic apotome brownish, with indistinct head spots. Antenna composed of 4 segments in proportion of 4.8: 7.0: 3.1: 0.3. Each cephalic fan with 38-40 main rays. Mandible with a large and a small mandibules serration but without supernumerary teeth. Hypostomium with 9 apical teeth, of which each lateral tooth largest; lateral serrations moderately developed on anterior 1/2; hypostomial setae 7 or 8 in number, divergent posteriorly from lateral margin on each side. Postgenal cleft spear-shaped, slightly constricted at base, pointed anteriorly and about 2.5-3.0 times as long as postgenal bridge. Thoracic and abdominal integument bare. Rectal gill lobes compound, each with 14-19 finger-like secondary lobules. Anal sclerite X-formed, anterior arms about 0.6 times as long as posterior ones. Ventral palillae absent. Posterior circlet with about 86 rows of up to 22 hooklets per row.

Holotype ♀, reared from pupa, slide-mounted, together with its pupal skin, was collected in a small trickle of water from Xiaolongtan, Shennongjia, Hubei Province (31°22' N, 110°15' E; alt. 2 200 m), 12 °C, 16 Aug. 2004, taken from submerged grass



Figs 15-29. *S. (S.) xiaolongtanense* sp. nov. 15. Female genitalia. 16. Cibarium. 17. Claw of female. 18. Female sensory vesicle. 19. Coxite and style of male. 21. Ventral plate. 22. Ventral plate in lateral view. 23. Ventral plate in end view. 24. Median sclerite. 25. Pupal filaments. 26. Cocoon. 27. Larval head capsule in ventral view. 28. Larval Mandible. 29. Larval anal sclerite.

blades and on fallen leaves in streams by LUO Hong-Bin. Paratypes: 1 ♀, 3 ♂, 12 pupae and 8 larvae, all slide mounted, same data as holotype.

Distribution. Hubei Province, China.

Remarks. According to the striated scutum of the female, the male style with basal protuberance, the 8-filamented pupal gill and the cocoon with anterolateral windows, this new species belongs to the *multistriatum*-group as redefined by Takaoka and Davies (1995).

This new species is apparently related to *S. (S.) sakishimaense* Takaoka, 1977 from Japan, *S. (S.) chongqingense* Zhu and Wang, 1995 and *S. (S.) unicum* Zhang and Chen, 2001 from China, *S. (S.) barraudi* Puri, 1932, and *S. (S.) digitatum* Puri, 1932 from India, and *S. (S.) hirtinervis* Edwards, 1928 from Malaysia. The new species, however, can be readily separated from all the related species mentioned above by the shape of the ventral plate and the style lacking apical spine and with short basal protuberance in the male style.

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latreille from Guizhou Province, China (Diptera: Simuliidae). *Acta Zootaxonomica Sinica*, 26 (2): 216-218. [动物分类学报]

湖北省神农架蚋类记要并记述二新种 (双翅目, 蚋科)

陈汉彬¹ 罗洪斌² 杨 明¹

1. 贵阳医学院生物学教研室 贵阳 550004
2. 湖北民族学院医学院生化教研室 恩施 445000

摘 要 报告湖北省神农架蚋类并记述蚋属 2 新种, 模式标本存放于贵阳医学院生物学教研室。

红坪蚋, 新种 S. (S.) hongpingense **sp. nov.** (图 1~ 14)
新种隶属于蚋亚属灰额蚋组 *griseifrons* group。与福州蚋、优分蚋极为相似, 但可根据下列综合特征如蛹茧具前侧窗, 特殊的盾饰, 以及雄虫生殖腹板和中骨的形状与上述 2 近缘种相区别。

正模♀, 副模 2 ♂♂, 4 蛹, 3 幼虫, 幼虫和蛹采自湖北省神农架自然保护区红坪小溪中的水草。

关键词 双翅目, 蚋科, 新种, 神农架自然保护区。
中图分类号 Q969. 442. 9

小龙潭蚋, 新种 S. (S.) xiaolongtanense **sp. nov.** (图 15 ~ 29)

新种隶属于蚋亚属多条蚋组 *multistriatum* group., 新种与蚋亚属的崎岛蚋、重庆蚋、钩突蚋、包氏蚋、地记蚋等近缘, 然而, 可通过雄虫的生殖腹板形状、生殖肢端节无端刺但具短的基内突与近缘种相区别。

正模♀, 副模 1♀, 3 ♂♂, 12 蛹及 8 幼虫, 均采自湖北神农架溪流被水淹没的水草及落叶中。